

WHAT IS CLAIMED IS:

1. A method of driving an electro-optical apparatus in which a plurality of pixels arranged in a matrix perform a gray scale display, said method of driving an electro-optical apparatus comprising:

5 selectively setting a number of subfields within a frame in accordance with a signal specifying a number of gray scale levels;

dividing said frame into the specified number of subfields; and

controlling on or off of each of the pixels in each of said subfields in accordance with the gray scale level of the pixels.

10 2. The method of driving an electro-optical apparatus according to Claim 1, further including:

providing said pixels in association with each of the intersections of a plurality of scanning lines and a plurality of data lines, so that when a scanning signal is applied to the associated scanning line, the pixels are turned on and off according to the voltages applied to the associated data line; and

15 supplying, for each of said subfields, said scanning signal sequentially to each of said scanning lines and supplying a signal which specifies on or off in accordance with the gray scale level for each of the pixels to each of the data lines corresponding to each of the pixels.

20 3. A drive circuit for an electro-optical apparatus which drives pixels that includes pixel electrodes disposed in association with each of intersections of a plurality of scanning lines and a plurality of data lines, and switching elements provided in association with each of said pixel electrodes and which electrically connect an associated data line and an associated pixel electrode when a scanning signal is supplied to the associated scanning line, said drive circuit for an

25 electro-optical apparatus comprising:
a scanning line drive circuit that supplies said scanning signal sequentially to each of said scanning lines for each of the subfields constituting a frame;

30 a data line drive circuit that supplies a signal which specifies on or off of each of said pixels for each of said subfields in accordance with the gray scale levels of each of said pixels to the data lines associated with the pixels during the period when said scanning signal is supplied to the scanning lines respectively corresponding to the pixels; and

a subfield number setting circuit that selectively sets the number of subfields within said frame in accordance with said signal which specifies the number of gray scale levels.

4. An electro-optical apparatus, comprising:
 - 5 a plurality of scanning lines that provide scanning signals;
 - a plurality of data lines;
 - a device substrate provided with pixel electrodes disposed in association with each of intersections of the plurality of scanning lines and the plurality of data lines, and switching elements provided in association with each of
 - 10 said pixel electrodes, which controls the electrical connection between the associated data line and the associated pixel electrode based on a scanning signal which is supplied via the associated scanning line;
 - an opposing substrate provided with an opposing electrode disposed opposing said pixel electrodes;
 - 15 an electro-optical material interposed between said device substrate and said opposing substrate;
 - a scanning line drive circuit that supplies said scanning signal sequentially to each of said scanning lines for each of subfields constituting a frame;
 - a data line drive circuit that supplies a signal which specifies on or off
 - 20 of each of said pixels for each of said subfields in accordance with the gray scale levels of each of said pixels to the data lines associated with the pixels during a period in which said scanning signal is supplied to the scanning lines respectively corresponding to the pixels; and
 - a subfield number setting circuit that sets a number of subfields within
 - 25 said frame in accordance with a gray scale level number specifying signal which specifies a number of said gray scale levels.

5. An electronic apparatus, comprising:
 - the electro-optical apparatus according to Claim 4; and
 - a control circuit which supplies said gray scale level number specifying
 - 30 signal to said subfield number setting circuit.

ABSTRACT OF THE DISCLOSURE

The invention reduces power consumption when, for example, a mobile personal computer is in a power-saving mode or when a cellular phone is in a wait mode, in an electro-optical apparatus, such as a liquid crystal display of the subfield drive type used as a display apparatus for various apparatuses. Three different settings "64", "16" and "2" are enabled as the number of gray scale levels in an electro-optical apparatus, the number of subfields becoming smaller as the number of gray scale levels is reduced. When a large number of gray scale levels is not required (when in the power-saving mode, the wait mode, etc.), a low number of gray scale levels is set, so that the own capacitance of a liquid crystal layer and storage capacitance are charged and discharged less often.

UNITED STATES PATENT AND TRADEMARK OFFICE
DOCUMENT CLASSIFICATION BARCODE SHEET



Abstract